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white component excepting that the closely neighboring and feeble γ_w, and β_w are blended into a single intermediate band in each group. The ϵ_w series moreover is slightly shifted towards the violet. The positions given are the averages from five of seven negatives measured.

In figures 3 and 4 only the groups near the reversing region have been indicated. Figure 5 shows all the bands thus far located in the polarized spectra of ammonium uranyl chloride. The diagram is by no means complete however for in the previous studies of the spectrum of this salt, already referred to, at least seven groups of fluorescence bands and eight groups of absorption bands were found. Preparations are in hand for extending the study of the absorption spectra into the ultra violet by means of a quartz spectrograph.

Analogous relations between the two components of the fluorescence and absorption spectra of the other three uranyl double chlorides, $2KCl. UO_2Cl + 2HO$; $2RbCl. UO_2 Cl_2+2H_2O$ and $2CsCl. UO_2Cl_2 +2H_2O$, have also been determined. Full data concerning these spectra and that of the ammonium uranyl chloride at +20° and −185° will be published at an early day.

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[1] Polarized fluorescence, first described by Grailich (*Krystall-optische Untersuchungen*, Wien, 1858) has since been studied by Maskalyne (*London, Proc. R. Soc.* **28**, 479), V. Lommel (*Ann. Physik., Leipzig*, **8**, 634), E. Wiedemann (*Ibid.*, **9**, 158), Sohncke (*Ibid.*, **58**, 417); G. C. Schmidt (*Ibid.*, **60**, 740), and H. Becquerel, (*Paris, C. R. Acad. Sci.*, **144**, 671).

[2] Becquerel, in the paper already cited, has noted the fact that the fluorescence spectrum is not changed by polarizing the incident light. Sohncke obtained a similar result with calcite and some other crystals but found certain exceptions to the general rule.

[3] See Nichols and Merritt, *Physic. Rev.*, Ser. 1, **27**, 373 (1908); also *Studies in Luminescence*, Carnegie Institution (1912).

THE LINGUISTIC CLASSIFICATION OF POTAWATOMI

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For a considerable period of time it has been commonly supposed that Potawatomi is very closely related to Ojibwa and Ottawa. The statement of William Jones in his *Some principles of Algonquian word-formation*[1] is the most authoritative one on this point. In my *Preliminary report on the linguistic classification of Algonquian tribes*[2] I concluded from my limited first-hand knowledge of Potawatomi that Potawatomi belonged to the Ojibwa group (comprising Ojibwa, Ottawa, Algonkin, Potawatomi; and somewhat removed from them Peoria, etc.) of Central Algonquian dialects, but that Potawatomi differed more from Ojibwa, Ottawa, and Algonkin than these from one another. But it should be carefully noted that thus far no data have been published to justify these opinions. In the course of the past winter the Bureau of American Ethnology had photostat copies made of three grammatical treatises on Potawatomi which were written by the Rev. Maurice Gailland years ago, but which exist only in manuscript form. In spite of the fact that these treatises are fundamentally arranged on the plan of Latin grammar which is wholly unsuited to the genius of Potawatomi, and that the phonetic system employed is patently inadequate, I have been able to construct nearly complete tables of the verbal pronouns of the independent, subjunctive, and subjunctive of the suppositive modes. From these, as well as from the fact that the negative of the independent mode is formed by means of a *ssi* suffix and that a sibilant is retained before *p*, it follows that the opinions expressed above are completely substantiated.

The personal subjective and objective pronouns which are incorporated in the verb are called 'verbal pronouns' in contradistinction to the independent personal pronouns which in Algonquian languages are used solely for emphasis. The highly specialized character of the verbal pronouns in the Central Algonquian dialects has made them thus far the most satisfactory classificatory criteria.

The decisive verbal pronouns showing the close relationship of Potawatomi to Ojibwa, Ottawa, and Algonkin are:

Independent mode: I—you, I—him, I—them (animate), we (exclusive) —thee, we (exclusive)—you, we (exclusive)—it, we (exclusive)—them (inanimate), we (inclusive)—it, we (inclusive)—them (inanimate), thou—him, thou—them (animate), ye (intransitive), ye—me, ye—him, ye—them (animate), he—you, he—him, they (animate)—us (exclusive), they (animate)—us (inclusive), they (animate)—you, they (animate)—him, they (animate)—them (animate).

Subjunctive mode: I—them (animate), we (exclusive)—thee, we (exclusive)—you, thou—them (animate), they (animate)—thee, they (animate)—him, they (animate)—them (animate), they (animate)—it, they (animate)—them (inanimate).

Subjunctive of dubitative mode: They (animate, intransitive).

The verbal pronouns showing the divergence of Potawatomi are:

Independent mode: we (exclusive)—him, we (inclusive) them (animate), we (inclusive)—him, we (inclusive)—them (animate), ye—it.

Subjunctive mode: I—you, we (inclusive)—him, we (inclusive)—them (animate), he—us (exclusive).

Subjunctive of the suppositive mode (corresponding to the Fox subjunctive of the interrogative mode): ten verbal pronouns.

By consulting the table of verbal pronouns on the folder at the end of my *Preliminary report*, the reader will at once see the importance of the pronouns mentioned above, in determining the linguistic classification of Potawatomi. Complete tables for Potawatomi will be published in the *American Anthropologist.*

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[1] *Amer. Anthrop., New York*, N. S., **6**, 369–411.

[2] *Smithsonian Inst., Rep. Bur. Amer. Eth.*, **28**, 221-290b.

THE LIGHT CURVE OF XX CYGNI AS A CONTRIBUTION TO THE STUDY OF CEPHEID VARIATION

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Probably as many as 90% of the 4500 stars whose light intensities are known to be variable may be placed in three well-defined classes. (1) The eclipsing variables are of various colors (or spectral types); their periods range from a few hours to a year or more in length, and their variation may be from less than one-tenth to several stellar magnitudes. (2) The long period variables are generally reddish stars; the cycle of their light-changes occupies from one hundred to six or seven hundred days, and the amount of their light variation is usually several magnitudes. (3) The largest class, however, since it includes the great number of variables in globular clusters and in other special regions of the sky, is that known as short period variables or Cepheid variables. Practically all types of spectra are represented, though types A and F predominate so far as now known. The periods in general are much less than 50 days, and for a very large subdivision (the cluster type variables) average about 12 hours. The variation, which is practically continuous, is nearly always of the order of one magnitude in range, and is characterized generally by a more rapid increase than decrease of brightness.

The cause and characteristics of eclipse variation are definitely known. But this can not be said of the other two main types of variable stars. Though many suggestions have been made, the true cause of long period variation remains more or less obscure. The interpretation of Cepheid variables has been much debated and much evidence in favor of various theories has been collected, but no explanation has as yet received general acceptance. The behavior of the spectral lines of Cepheids has led to the widely adopted assumption that they are spectroscopic binaries and that the light variations are in some way related to orbital